



US005870527A

United States Patent [19]

Fujikawa et al.

[11] Patent Number: 5,870,527

[45] Date of Patent: Feb. 9, 1999

[54] ROBOT CONTROL METHODS AND APPARATUS

[75] Inventors: Takayuki Fujikawa, Kanagawa;
Masahiro Fujita, Saitama, both of
Japan

[73] Assignee: Sony Corporation, Japan

[21] Appl. No.: 730,934

[22] Filed: Oct. 16, 1996

[30] Foreign Application Priority Data

Oct. 17, 1995 [JP] Japan 7-268422

[51] Int. Cl.⁶ G05B 11/32; G05B 19/42

[52] U.S. Cl. 395/80; 395/93; 395/85;
395/670; 395/672; 395/673; 395/674

[58] Field of Search 395/85, 670, 672,
395/673, 674

[56] References Cited

U.S. PATENT DOCUMENTS

5,008,834	4/1991	Mizuno et al.	364/513
5,250,886	10/1993	Yasuhara et al.	318/567
5,303,384	4/1994	Rodriguez et al.	395/99
5,325,468	6/1994	Tersaaki et al.	395/97
5,430,643	7/1995	Searji	364/167.01
5,513,299	4/1996	Terasaki et al.	395/90
5,519,814	5/1996	Rodriguez et al.	395/99
5,545,960	8/1996	Ishikawa	318/587
5,550,953	8/1996	Searji	395/98
5,608,843	3/1997	Baird, III	395/23

OTHER PUBLICATIONS

Kiyoshi, et al., "Trajectory Planning Using Optimum Solution of Variational Problem", 1993 Power Conference IEEE, p. 666-671.

Sungtaeg Jun, et al., "A Probabilistic Approach to Collision-free robot path Planning", Robotics and Automation 11988 IEEE Int'l Conference, p.220-225.

Hiroshi Ueno, et al. "On Control and Planning of a Space Station Robot Walker", Systems Engineering, 1990 IEEE Int'l Conference, p. 220-223.

Primary Examiner—Tario R. Hafiz

Assistant Examiner—Jagdish Patel

Attorney, Agent, or Firm—Ronald P. Kananen

[57] ABSTRACT

A robot control method for controlling the operation of a robot so as to pass through a plurality of states corresponding to a predetermined operation, comprising determining at least one operational arc between two directly passable states among the plurality of states showing the operation of the robot when passing between the two states, giving to each of the determined operational arcs a weighting coefficient corresponding to the probability of that operational arc being selected, selecting on a probable basis one of the operational arcs between the two states when making the operation of the robot pass between the two states based on the weighting coefficients of the operational arcs between the two states, and controlling the robot so as to perform the operation shown by the selected operational arc when making the operation of the robot pass between the two states.

5 Claims, 8 Drawing Sheets

